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SPACE CENTER Roundup

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1999 Open House attracts record crowd

By Nicole Cloutier

JSC HOSTED MORE THAN 120,000 VISITORS at this year's Open House held August 28, some of which came from all over the world.

Gehman, his wife, Margaret, and their two children, Nicholas, 7, and Lilya, 2, enjoyed lunch under a shade tree near Bldg. 1 after a morning filled with facility tours, rocket building and meeting astronauts. Nicholas and Lilya are from Russia and were adopted by the Gehmans, who live in Houston. They say the international scope of the space program has a special meaning for their family.

"We can point out different things to them, like the Soyuz or the space station mockups, and say, 'Look Nicholas, this is from Russia,'" said Margaret Gehman. "It's really neat to be able to show them things from their home."

The Gehmans are regular visitors to Open House, but for many, this year's event was the first visit to JSC, or to any of our nation's space centers.

"It's amazing to see how much goes in to preparing for each mission," said Michelle Briscoe, in town from Yorba Linda, Calif., with her two children. They were able to visit the Sonny Carter Training Facility during Open House while on a trip visiting her sister, Christina Mattack of Clear Lake. "I was surprised to learn that they begin these practice dives a year in advance of the mission."

"The pool is REALLY neat," said Kyle Briscoe, 11, and a self-proclaimed space fan. "Just that it's so big and 40 feet deep!"

"Our father worked for Rockwell," said Mattack. "He's retired now, but we never got to see 'behind-the-scenes' like this when he worked on the program."

An inside look at the how the space program works and all the spin-off benefits derived from NASA research is what Open House is all about. For some Open House volunteers, the inspiration they receive from sharing NASA's achievements with the community is just as rewarding.

"I enjoyed it immensely and think more employees should volunteer for next year," said Mark McGill, GHG shuttle safety engineer. McGill volunteered for the first time this year, assisting with the popular Rocket Stomp booth at Bldg. 2. "To me, that booth symbolizes all that JSC, and NASA, are about. The kids loved it and were full of questions. It appealed to all ages and allowed children to participate while teaching them at the same time."

"This was a true spectacle of space flight," said Rob Navias, chairman

of the 1999 Open House. "It was an amazing way to share our work with the public and to inform them about how their tax dollars are being spent for the benefit of all of us on Earth as we head into the new millennium."

Visitors of all ages were able to see, up close and personal, the nation's premier human space flight center, including some areas opened to the public for the first time and some special visiting exhibits.

"This is a great place," said Mark Anderson, a senior aerospace engineer from Iowa State University. He was joined by a small contingent from the school that brought a transportable wind tunnel for display at Open House. Inside the wind tunnel, which is about the size of a vendor cart at the local mall, is a small remote-controlled airplane that visitors can actually 'fly' from a mock console facing the tunnel.

"The kids love it!" added Anderson. "Some of them sit right down, and think that they know what they're doing. Others just stand to the side, and watch in awe. It's a fun way for us to explain some simple principles of flight to them, but we have to

bite our tongues while we work with the kids and make sure we don't bore them with a bunch of techno-babble."

The Flight Demonstration Wind Tunnel, which was built this year by the students, was like many booths at Open House that had a steady stream of visitors waiting to "try it out" and a thick crowd of spectators. They estimate 60 children per hour were able to try out the airplane.

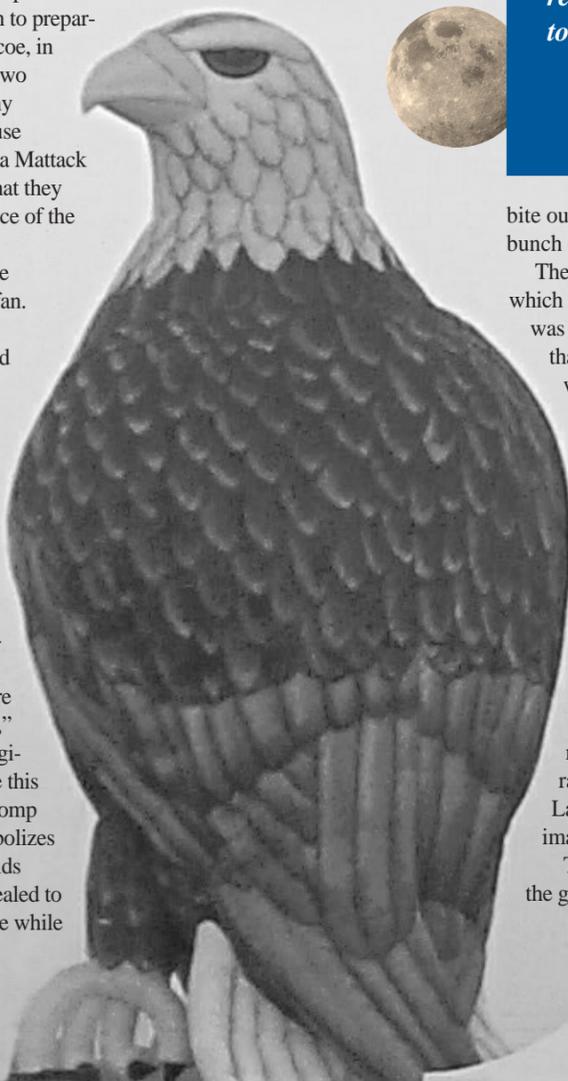
Another new attraction included the programs in Teague Auditorium. This year's presentations, which were held all day, contained visual excitement and entertainment.

The presentations, by Capt. John Young, the STS-93 crew, Astronauts Cady Coleman, Tom Jones, Yvonne Cagle and Scientist Chuck Lloyd, ranged from a recap of missions past as well as discussion of the future of space exploration. As a fitting finale to the series of mission and technology presentations, the Clear Lake Symphony filled the auditorium with celestial music while out-of-this-world imagery captured the visual aspects of space exploration.

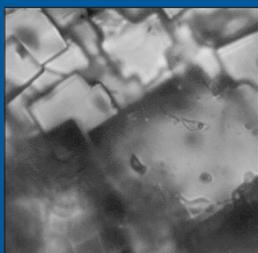
The credit for the success of Open House goes to the more than 2,800 volunteers and the growing experience base for hosting such an event. ■

Open House photo contest winners will be announced in the next issue of the Roundup.

Thank you for this fun and fantastic learning experience. My whole family, especially me, really loved it! Big thanks to all the volunteers.
— Anonymous
from comment card returned at Open House 1999



Open House visitors tour the Iowa State University wind tunnel exhibit.



JSC scientists strike water in meteorite.

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Joys of space flight shared at air show.

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College students soar to new heights.

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Extraterrestrial liquid water found in meteorite

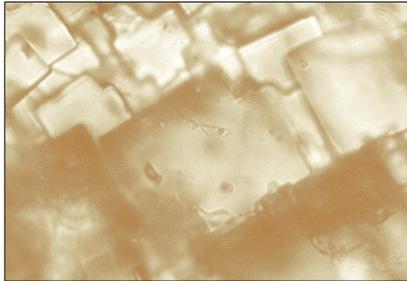
For the first time, liquid water has been found in an object from space. This discovery has led to speculation that life may exist elsewhere.

On the 22nd of March last year in Monahans, Texas, a meteorite streaked across the sky and fell to Earth. Upon quitting their basketball game, a group of seven boys went over to inspect it. What they found was a black, grapefruit-size rock.

The next day, NASA-JSC space scientist Dr. Everett Gibson arrived and took the meteorite,

later named Monahans 1998, back to JSC for analysis. In a JSC clean room two days later, the rock was carefully opened with a hammer and chisel. To their surprise, researchers found

halite crystals (table salt) inside, and within these crystals they found bubbles of water, marking the first time that anyone has found liquid water in an



object recovered from space—and a potential indication that life may exist outside our planet. A team led by NASA-JSC scientist Dr. Michael Zolensky reports this discovery in a recent issue of the journal *Science*.

“The existence of a water-soluble salt in this meteorite is astonishing,” writes Robert N. Clayton of the Enrico Fermi Institute at the University of Chicago in the August 27, 1999, issue of *Science*.

“Also, this sample of aqueous solution trapped within the meteorite provides the first opportunity to study solar nebular water directly.”

Because Monahans 1998 was recovered rapidly and isolated from terrestrial contaminants such as moisture from our atmosphere within two days

after it hit Earth, researchers had an atypically fresh sample to test. The scientists were excited to find blue and purple crystals of halite inside. Halite is

“The existence of a water-soluble salt in this meteorite is astonishing. Also, this sample of aqueous solution trapped within the meteorite provides the first opportunity to study solar nebular water directly.”

—Robert N. Clayton
Enrico Fermi Institute
University of Chicago
in the August 27, 1999,
issue of *Science*

a salt crystal that is usually formed from evaporation of briny water.

The crystals were up to 3 millimeters (less than a tenth of an inch) in size.

These are the largest halite crystals ever seen by scientists in any extraterrestrial material. The presence of briny water

inside the crystals was confirmed by shining a laser beam through the bubbles and measuring the resultant light spectrum. The brine could have been flowing within the asteroid itself when it was in space or it could have been deposited on the asteroid by a passing object, such as a comet.

The crystals have turned blue and purple because of the radiation they received while in space. JSC scientists Dr. Larry Nyquist and Don Bogard have dated the halite and found it to be 4.5 billion years old. That means that the trapped water could predate the sun and planets in our solar system.

Still to be determined is how the meteorite got wet. One possibility is that a passing comet smashed into the rock, dropping off a load of liquid water. Or perhaps the rock may have chipped off an asteroid that holds pools of fluid. The JSC research team still needs to determine whether the water comes from our own solar system or is from interstellar space.

Look for a follow-up article on this subject in an upcoming issue of the *Roundup*. ■

Chandra's first images reveal X-ray vision

By Nicole Cloutier

Only seven weeks into its orbital life, the Chandra X-ray Observatory has already dazzled observers with vibrant and crisp imaging of violent stellar activity. One image depicts a gaseous projection stemming from a luminous distant quasar 6 billion light years away. Another image proves a remarkable exhibition of Chandra's sharp detail capability, revealing what may be a neutron star or black hole near the center of the expanding Cassiopeia A supernova.

“This is just a beautiful sight,” said Harvey Tananbaum, director of the Smithsonian Astrophysical Observatory's Chandra X-ray Center. “Those of us who've worked on it are absolutely enthralled with it.”

Chandra was deployed July 23 by the STS-93 crew as NASA's third Great Observatory. Its impressive X-ray capability was designed to complement the Hubble Space Telescope, which captures ultraviolet and optical images, and the Compton Gamma Ray Observatory. A fourth observatory, the Space Infrared Telescope, is scheduled for launch in 2001 and will complete the observatory collection allowing scientists to view the complete spectrum of radiation.

The X-rays Chandra collects are emitted by extremely hot sources, and are more than 1,000 times more energetic than the photons of normal light perceived by our eyes. Chandra's instruments, powerful enough to separate details as small as this newsprint from half a mile away, are able to produce images using radiation invisible to other telescopes.

“When you look at the optical picture you can ask yourself, ‘Where is the massive star? Where is the neutron star?’” explained Professor Robert Kirshner of Harvard University. “You don't really see them in the optical [images]. It's in the X-ray where you have the opportunities to see these things.”

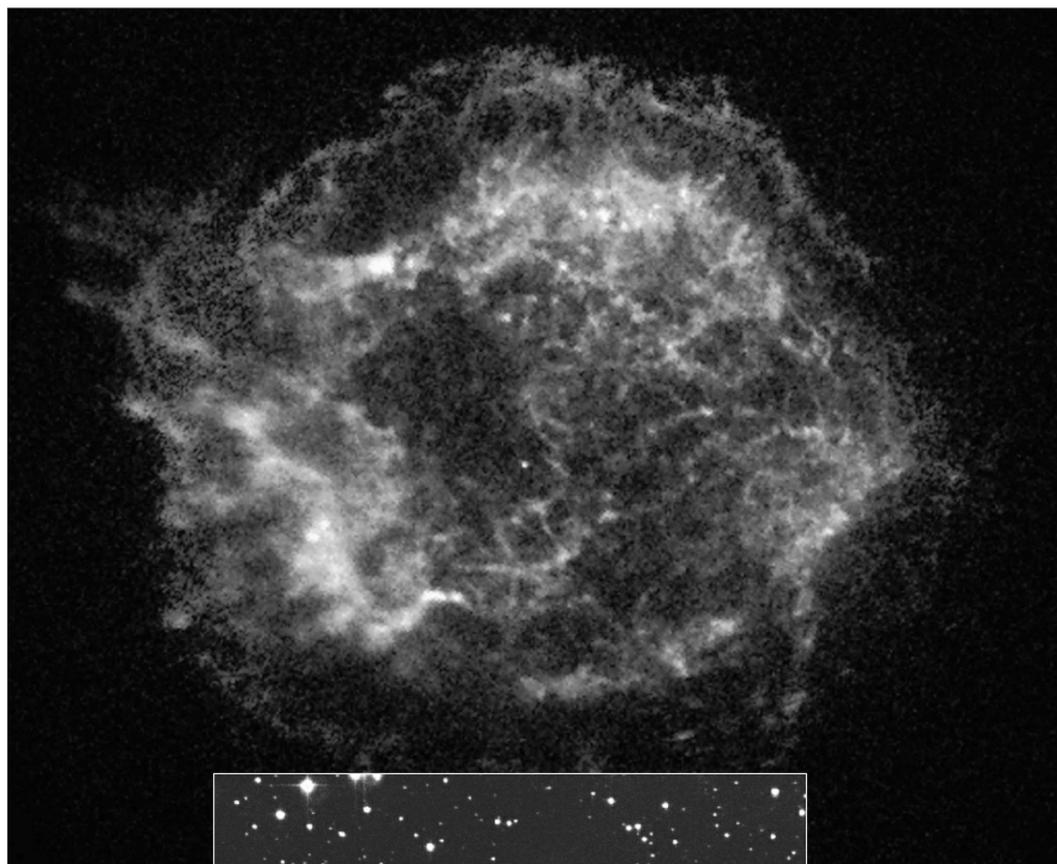
Additionally, Chandra has tools that enable it to measure the mass and chemical makeup of the stellar objects, such as sulfur, silicon, calcium and iron identified in the Cassiopeia A observation.

The Cassiopeia A image represents the remnant from a violent explosion some 320 year ago. Once a massive star, likely 10 - 30 times brighter than the sun, the stellar material escapes from the explosion at 10 million miles per hour, creating powerful shock waves. As the waves collide with surrounding material, an ever-expanding sphere of hot X-ray emitting gas is formed. It is these emissions that Chandra detects and images to create the “first light” picture which excited scientists around the world.

As an unanticipated bonus, while homing in on a calibration target, scientists also identified a protruding X-ray jet from a remote quasar. Scientists believe an enormous black hole at the quasar's center gives it the immense power equal to 10 trillion suns. Coupled with radio telescope observations, researchers anticipate that Chandra's imagery will help explain how such cosmic jets are formed from the regions near massive black holes.

“Chandra has a tremendous amount of promise and we're going to have many more discoveries that come from its excellent properties.”

—Robert Kirshner
Harvard University



Optical telescope image of Cassiopeia A shows much less detail than that taken by the Chandra Observatory.

Above: Chandra's first X-ray image of the Cassiopeia A supernova remnant reveals a fast outer shock wave and slower inner shock wave. The inner wave is believed to result from material ejected from the supernova explosion colliding with the matter around it, heating it to a temperature of 10 million degrees. The outer wave may be related to an awesome shock wave resulting from this collision. The bright object near the center may be the long-sought neutron star or black hole remnant of the explosion that produced Cassiopeia A.

“This is a fabulous discovery,” said Kirshner. “And to do this, on day one, is like an infant opening its eyes for the first time and discovering a new planet. Chandra has a tremendous amount of promise and we're going to have many more discoveries that come from its excellent properties” ■

More information on Chandra and its first images can be found at <http://chandra.nasa.gov> or <http://chandra.harvard.edu>.

COMMUNITY NEWS**Clemson professors kick off NASA-JSC Engineering Seminar series**

Two professors from Clemson University were the featured speakers as the NASA-JSC Engineering Seminar series kicked off August 11 in the Bldg. 30 auditorium. Clemson University will also be the site of the 8th EVA forum sponsored by the EVA Directorate/XA on November 9 and 10, 1999.

Dr. Larry Dooley, professor, chair of the Bioengineering Department, and director of the School of Chemical and Materials Engineering, and Dr. Christine Jarvis, J. E. Sistine professor of textiles and director of Clemson Apparel Research, presented a joint seminar at the invitation of NASA.

Dr. Dooley presented an overview on fiber and materials research conducted within The Center for Advanced Engineering Fibers and Films (CAEFF) at Clemson University. CAEFF is a National Science Foundation Engineering Research Center, a partnership between Clemson and the Massachusetts Institute of Technology as well as more than 10 major corporate partners. The center provides an integrated research and education environment for the systems-oriented study of fibers and films, such as those used in EVA suits and pressure suits. The center depends on a solid science base leading to methods which couple molecular and continuum modeling. Combined with virtual reality teaching aids and rapid prototyping, the center allows the rapid and efficient development of new products and processes.

Dr. Jarvis discussed the Clemson Apparel Research Center with emphasis on Department of Defense-supported research for advanced manufacturing methods of specialized clothing, as well as anthropometric measuring techniques (such as laser scanning) and related research. The center is closely coupled with the School of Textiles, Fiber, and Polymer Science which has worked in these areas for "instruction, research and service" for more than 100 years.

"The primary focus of what we are doing in our center is to create a new paradigm," said Dooley. "Our thinking is that we need to create the fundamental science base for fiber and film work, combine that with experimental data through

Center research is expected to revolutionize the production of fibers and films, which could generate more than \$200 billion in revenue industry-wide. The center is the only one in the nation to deal exclusively with fibers and films, an industry

A full-fledged research and production facility, the Clemson Apparel Research center is not a typical academic department. "Clemson Apparel Research reports to the chief research officer of the university. It is not an academic department. We have no tenure-track faculty," said Jarvis.

Major objectives of Clemson Apparel Research include operating a model apparel plant using state-of-the-art manufacturing technology and innovative management techniques, assisting apparel manufacturers on the use of nontraditional capital investment criteria in the purchase justification of advanced manufacturing technology, and working with other U.S. universities and industries to provide assistance to the Department of Defense and military contractors.

Clemson Apparel Research projects include redesigning the patterns for Navy men's clothing and Air Force women's flight suits. Since 1993 the center has produced more than 7,000 special measurement shirts for Army men and women, Air Force women, and Marine Corps women.

Engineering seminars will be periodically sponsored by JSC to provide employees not only with information related to advancements in their own fields, but also to introduce them to research and developments in new areas which could have unexpected impacts on existing projects. Suggestions for speakers and topics should be directed either to the Assistant Director, University Research and Affairs, Dr. Bonnie Dunbar, or to the Engineering Directorate, Donna Mays. For more information on the seminars contact Stephen Wiggins (x33078) in JSC's Human Resources Development Branch. ■

For information on the upcoming 8th EVA forum contact Tony Bruins (anthony.c.bruins1@jsc.nasa.gov) or Dr. Dooley (dooley@clemson.edu).



JSC Photo S99-09064 by James Blair
Dr. Christine Jarvis and Dr. Larry Dooley were the featured speakers for NASA JSC's Engineering Seminar series. Jarvis and Dooley, center, are shown above with Astronaut Timothy J. Creamer, left, and JSC Assistant Director, University Research and Affairs, Dr. Bonnie Dunbar, right.

mathematical models, and then take advantage of the advances that we realize in the computational sciences and engineering."

According to Dooley, the fiber and film industry is characterized by demand for efficiency, customer-specific products, and low manufacturing costs due to the use of fully automated plants. He sees the demand for specialty fibers and films growing by 50 percent by 2008.

Dooley sees opportunities, for example, for forming low-cost polymers such as nylon into fibers with Kevlar-like properties and being able to fabricate lasers 4 mm in diameter from electrically conducted polymers. "We see these types of applications for new fibers and films if we have the technology to understand the structure/property relationships to be able to develop the material."

that accounts for 25 percent of the manufacturing segment of the U.S. gross domestic product and is the dominant industry in the South. The industry's manufacturing base includes electronic components, fiber optic cables, synthetic fibers, multi-layer food-packaging films, and reinforced composites used in construction and aircraft. Products to be affected – in some cases, reinvented – as a result of Clemson research can be found in fields as diverse as biomedicine, transportation, communication and construction.

The Center for Advanced Engineering Fibers and Films works with facilities at other national centers and industrial laboratories including NASA's John H. Glenn Research Center at Lewis Field in Cleveland, Ohio.

NASA shares joys of space flight with air show enthusiasts

Seven NASA centers, including JSC, joined together to share the excitement of space flight and technology with the more than 765,000 attendees at the Experimental Aircraft Association (EAA) AirVenture Oshkosh, held July 28 – August 3 in Oshkosh.

AirVenture's campus of more than 1,200 acres at Wittman Regional Airport, showcased more than 2,200 competition aircraft, 700 aviation exhibits and 500 forums, workshops and seminars to highlight its 47th anniversary. NASA aircraft, displays and interactive simulators and tours peppered the airshow site.

"It's vital to have NASA here at EAA AirVenture," said Dick Knapinski, EAA spokesman. "They are on the forefront of the technology that will take aviation into the next century."

The event's high attendance included more than 2,300 international guests from 77 nations, providing an impressive venue for sharing information on the increasingly global nature of the space program and the International Space Station already in progress.

"People are getting a renewed interest in space," said Louis Parker, JSC Exhibits manager. "And things that NASA can do, like this, help to raise awareness of advances in the space program. It sparks a dialogue with people that fuels the interest in our country's space program."

In addition to representatives and exhibits from JSC,

Glenn Research Center, Marshall Space Flight Center, Langley Research Center, Lewis Research Center, Ames Research Center, and NASA Headquarters also participated in the event.

NASA Administrator Dan Goldin received EAA's Freedom of Flight Award during the event for his support of aviation and noted how AirVenture participants are on the leading edge of aviation development.

"It was very exciting to see the innovation as I visited engine and airframe manufacturers here," Goldin said. "They're pretty bullish. ... Seeing this, it's easy to be optimistic for aviation's future."

NASA exhibits filled two buildings and a portion of the EAA Pavilion. Included in NASA's displays was the Airborne Research Integrated Experiments System (ARIES), a technology-loaded Boeing 757 flying lab. The aircraft, operated by NASA's Langley Research Center, incorporates computerized mapping system technology and can execute automated landing trials using the Global Positioning System.

NASA's interactive displays included a walk-through mockup ISS module with prototype microgravity racks; the Ascent/Entry Trainer, a desktop simulator used to supplement astronaut training; a hands-on "Dock the Shuttle" simulator; and a "Tour the Space Station" kiosk. A cutaway spacesuit was set up for visitor photo opportunities as well.

Astronauts Linda Godwin, Greg Harbrough, Scott Horowitz, Steve Nagel, Charlie Precourt, and Stephen Robinson also were on hand for daily presentations on the space program and autograph signings.

"NASA's exhibits were a pretty big hit," added Parker. "The crowds that attend AirVenture are interested in space – but the things we've done in the past year, with John Glenn and Eileen Collins, have really peaked their interest. JSC's support of the event this year was just icing on the cake for what NASA was already doing."

More than 10,000 airplanes, representing all types, sizes and eras, were flown to the Oshkosh area to attend the annual celebration of flight. In addition to a flyover from the U.S. Air Force Thunderbirds demonstration team, enthusiasts were witness to various aerial acts, including a competition which featured six of the world's best air show pilots – Sean D. Tucker, Gene Soucy, Matt Chapman, Mike Goulian, Ian Groom and Rocky Hill.

Show visitors also were treated to a collection of rare aircraft on display, including such one-of-a-kind aircraft as the Sikorsky S-38 amphibian replica, Kruezer K-5 tri-motor and Boeing 247D transport, among others. The Proteus, an all-composite canard aircraft designed for high-altitude missions, including telecommunications and atmospheric studies, also was on display. ■

College students soar to new heights

By Eileen Hawley

Ah, the unmistakable signs of an August in Houston - the heat, the humidity, the 32 teams of college students at Ellington Field - there's nothing quite like it anywhere else.

Ellington Field once again was host to the KC-135 undergraduate campaign, and for three weeks JSC employees worked together to provide a once-in-a-lifetime experience for the participants. From the teams of co-ops who cooked a welcoming barbecue and gave personally guided tours of JSC, to the flight crews who took the "Weightless Wonder" aloft, to the astronauts who inspired the students, and the flight doctors who tended to them, the students got a unique perspective of life at the Johnson Space Center.

"Even beyond the satisfaction of designing and completing a project, this program teaches students the importance of research," said Jasmine Jensen, University of Utah student. "From the day I arrived at JSC, I had a lot of respect for the program and the standard of quality that it upheld. The environment - both the program and the KC-135 aircraft - helps students to make important decisions about their future plans and exposes them to possibilities that we otherwise would not have been aware of."

"We've flown more than 500 students in three years, and our data tells us we're providing a significant educational milestone for the overwhelming majority of them," said Donn Sickorez, JSC education coordinator for the program. "I'm pleased to be involved in a program that gives good students a behind-the-scenes look at science, engineering and the Johnson Space Center."

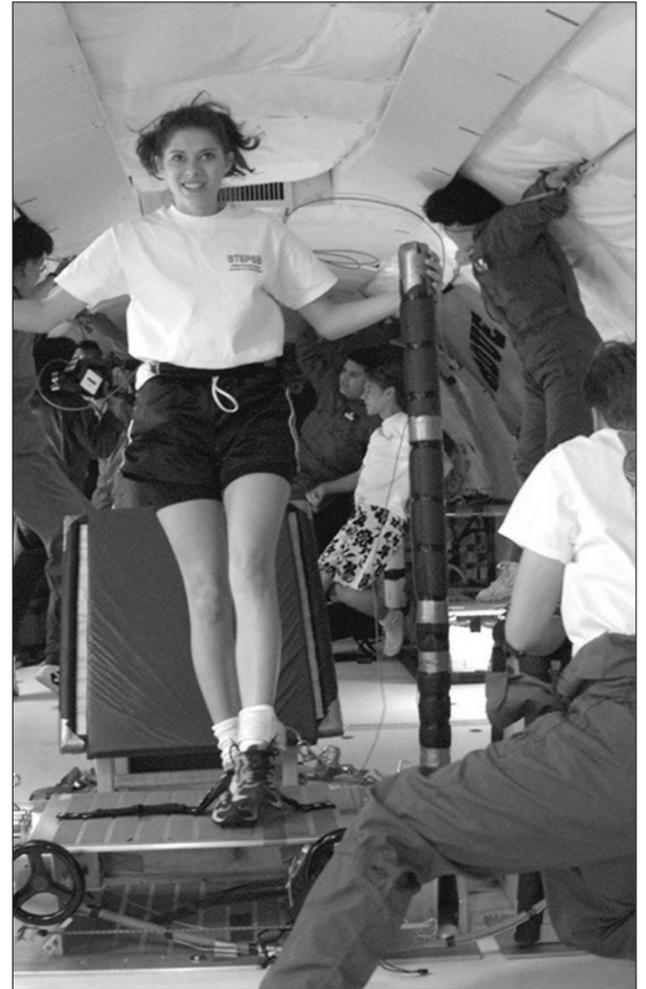
"These students are fun to train, they pay attention, score well on the examination and take the chamber ride in stride," said Mike Fox, Kelsey-Seybold physiological trainer.

"I flew with the University of Maryland in the second week of August," said Florentino Garcia. "I enjoyed the program and learned where engineering can take people. The KC-135 was an amazing experience that opened my eyes to the possibilities that science can provide. I thank all of NASA for an amazing trip. Hope to visit again."

The August flights brought to a close the third year of a program that provides undergraduate students from around the United States with an opportunity to experience the thrill of microgravity and conduct science in a unique environment. Undergraduates fly in March and August. Texas high school students fly in April, and soon, junior colleges will have an opportunity to join in the experience. ■



JSC Photo 99e09375



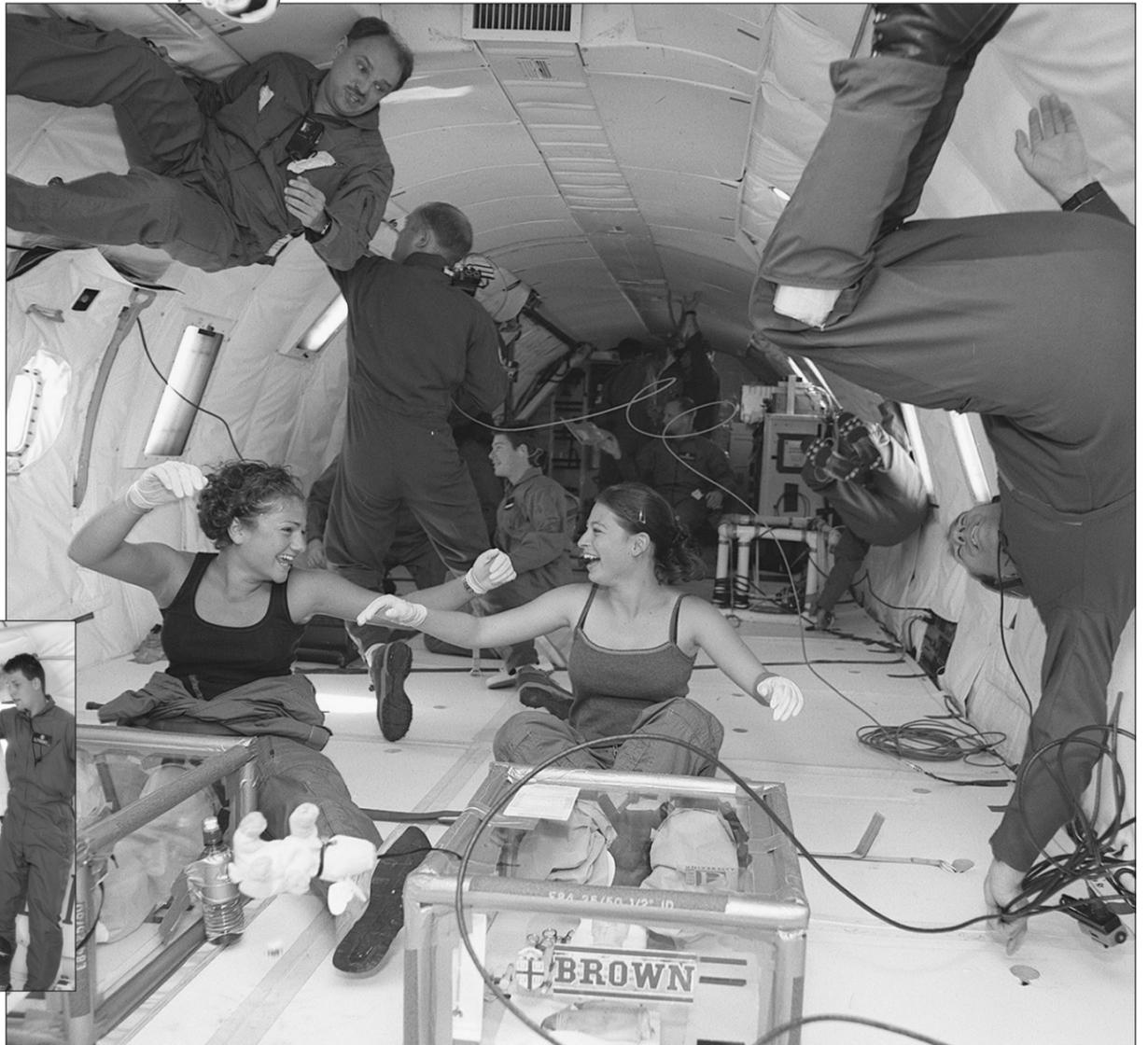
JSC Photo 99e10370



JSC Photo 99E09778

"A wonderful and unforgettable two weeks!"

"The KC-135 Zero-G Student Campaign is a great opportunity for teams of students to experience firsthand the rewards and challenges of being a part of America's space program," said Astronaut Bob Cabana. "I had the opportunity to talk with many of the experimenters during their visit to JSC and it was very rewarding. Their enthusiasm and desire to learn and benefit from their experience is contagious. These highly motivated students were eager to share their projects with me on the ground and couldn't wait to get the results from their KC-135 flight. Some approached the flight with minor trepidation after hearing stories about the experiences of some of those who went before them. Once airborne, however, their unbridled enthusiasm was something to behold."



JSC Photo 99310352

One to watch: JSC co-op named Rhodes Scholar

By Nicole Cloutier

Jennifer Gruber, a JSC co-op in the Flight Design and Dynamics Division, departs this month for England where she'll join the world's oldest international fellowship as a Rhodes Scholar.

Gruber, who is completing her fifth tour as a NASA co-op, will pursue a Ph.D. in engineering science at the legendary University of Oxford.

"I am really looking forward to the adventure of living in another country," said Gruber. "It will be my first time out of the country, except for a recent four-day trip to Budapest. I was one of a dozen Rhodes Scholars from my class joining the student delegation to the NATO workshop on political and military decision-making there earlier this year."

In fact, while on that trip, Gruber had a chance to meet Story Musgrave who was at the conference making a presentation on space exploration and experiences from his flights. Gruber plans to be an astronaut herself, so meeting Musgrave was a highlight of her trip.

"I would like to go to Mars," says Gruber, who was inspired to be an astronaut from a young age, when she saw *The Right Stuff*. "I saw those guys and thought, 'Wow! These guys get to go on these great adventures in space.' The combination of space and adventure was intriguing to me. Even when I was younger, I was always the type to push the envelope, and my mother's patience."

Gruber grew up in Omaha, Nebraska. The second of four children, Gruber's parents were a big inspiration. "My father is a bricklayer and my mother is a teacher. My mother was a really important role model. When I was 8 years old, she started college and got a degree in education. And to do that, while raising four children, was very impressive. She graduated *summa*, so that was my goal when I went to college. At graduation, it was really neat, to remember watching her graduate *summa*, and then for her to be able to watch me do it."

Gruber graduated in May from Boston University with both bachelor's and master's degrees in aerospace engineering. She plans to use that background for her ion propulsion research while at Oxford.

She originally joined JSC's co-op program back in 1996 with the Simulator Operations and Technology Division. Other co-op tours followed including one in Space Flight Training Division and three with the Flight Design and Dynamics Division.

"In DM, they believe in the 'it takes a division to raise a co-op' philosophy," said Gruber. "As a result, I've had a great variety of projects and mentors, and I've learned a lot about operations. I love the



JSC Photo S99-09554 by Robert Markowitz

Jennifer Gruber, NASA co-op, leaves for Oxford University as a Rhodes Scholar this month.

focus on teamwork here. So many people are willing to answer questions and help with projects when they can. For example, my main project, the maneuver confirmation software, would not have been successful without the help and guidance of Charlie Barrett, Steve Stich, and Chris Edelen. I also enjoy feeling like part of the team, in that I have my own responsibilities and people count on me to do my part. DM is a great place to co-op!

"This is where I've really discovered my passion for exploration," said Gruber, of her NASA experience. "Human space exploration is so exciting to me." Gruber says she fully intends to return to NASA after her education at Oxford, and pursue a position in flight control and eventually astronaut candidacy.

"We are extremely proud of Jenny's selection as a Rhodes Scholar," said Steve Stich, Ascent Entry Flight Dynamics group lead. "She is a very talented, energetic, and practical young engineer with a bright NASA future ahead of her. Her talents will be missed while she is away studying at Oxford."

Many experienced co-workers also speak highly of Gruber. Lisa Shore, ascent flight dynamics officer, comments, "I have no doubt that Jenny will accomplish anything she sets her mind to. They might as well start measuring her for her astronaut suit now."

Gruber has received two Cooperative Education Special Achievement awards and one Cooperative Education Flag Award for her work at NASA. She helped develop the space shuttle maneuver confirmation software used by the flight dynamics officers in the MCC. She was a

research assistant working on a micro-electromechanical sensor device at Boston University. Gruber was a Dean Elsbeth Melville Scholar at Boston University and was the student speaker at BU's 1999 commencement ceremony.

"My advice to younger students is to keep working and persevere when you think you've failed because things have a funny way of working out," said Gruber. "Also, be ready to take any good opportunity that comes your way, even if you haven't planned for it. If you're able to roll with the punches, you have a greater chance of doing something really interesting and fun that you didn't know you could do before. I learned that when I decided to apply for the Rhodes, even though it wasn't part of my plan." ■

Vice President Gore praises NASA employee

Dan Clem, safety engineer, was presented with Vice President Al Gore's monthly "Plain Language" award recently for spearheading the rewrite of a NASA safety manual. Clem received the award at a presentation at the Air & Space Museum in Washington, DC, July 20.

Clem worked with Stacey Menard, safety engineer, and a team of 12 Hernandez Engineering Inc. Safety and Fire Protection Services contractors to revise the 600-plus-page Safety and Health Handbook into plain language.

"The project took us about four months," said Clem of the comprehensive task. "I was really happy to find out we had won. I had never seen a vice president in person before much less shaken hands with one, so it was very exciting."

Clem began the rewriting project in 1996 after JSC Director George Abbey initiated a movement toward making NASA documentation and regulations more "readable." Clem's team streamlined the original Safety and Health Handbook, which was laden with "legalese," and reorganized it in a user-friendly question and answer format. Each chapter begins with "Who must follow this chapter?" so employees can easily find the information they need.



Dan Clem receives award from Vice President Al Gore

"This is a great example of taking critical technical information and making it accessible to the reader," said Gore who issued a 1998 Executive Memorandum directing all executive agencies to move toward use of plain language in their requirements, documents and correspondence. "More importantly, the rewrite of this manual will help ensure a safer workplace for NASA's employees."

"Safety is our number one priority at NASA," said NASA Administrator Daniel Goldin. "I can't think of a better way to promote that goal than to communicate safe procedures to our employees in plain language. I'm very proud of the team at Johnson Space Center for this achievement and for the Vice President's recognition." ■



JSC Photo S99-09552 by Robert Markowitz

DM's team approach to co-op training has helped Jennifer Gruber get the most from her JSC experience and helped prepare her for her upcoming tour as a Rhodes Scholar. Team members include, from left, front: Richard Jones, Carson Sparks, Gruber, Lisa Shore and Charlie Baret; back: Steve Stich, Ed Gonzalez, Keith Fletcher, and Greg Oliver.

Ripped from the ROUNDUP

Ripped straight from the pages of old Space News Roundups, here's what happened at JSC on this date:

1 9 6 4

Ling-Temco-Vought is developing a compact space pack which promises to convert an astronaut in a pressure suit into a one-man space vehicle for assembling and servicing spacecraft in orbit, transferring from one vehicle to another and performing numerous other tasks in space – all independent of the parent spacecraft.

The space pack will enable an astronaut, for the first time in the nation's space program, to be completely detached from the orbiting spacecraft and perform useful missions in the weightlessness of space.

1 9 7 9

Tom Wolfe's new book about the age of rockets, the early astronauts, and the world of military flying is about to be released, and the author will be in town to sign autographs.

Wolfe started *The Right Stuff* in 1973. He came to JSC, interviewed more than 30 astronauts and pilots and became fascinated with the dangers of being an astronaut or test pilot, individuals who, he says, "go up in a hurtling piece of machinery and put (their) hide on the line and then have the moxie, the reflexes, the experience, the coolness, to pull it back in the last yawning moment – and then to go up again the next day and the next day, and the next day."

1 9 8 4

NASA last week issued a Request for Proposal (RFP) to U.S. industry for definition and preliminary design of a permanently manned space station. The space station will support scientific and commercial endeavors in space, stimulate new technologies, enhance space-based operational capabilities and maintain the United States' leadership in space. Because it will be a multipurpose facility serving many users, NASA's objective is that the space station be "customer friendly" and be dedicated to fulfilling customer requirements in its design and operation.



Nature's most violent storm

Employees empowered for safety

Here in the USA, tornadoes have occurred in every month, so any time is a good time to review tornado safety procedures. Only a small percentage of tornadoes actually strike occupied buildings, but every year a number of people are killed or injured. The chances that a tornado will strike a building that you are in are very small, however, and you can greatly reduce the chance of injury by doing a few simple things.

The normal lead time for a tornado warning is no more than 20 minutes and is typically less than that. There may be no warning. Sometimes there are not a lot of options for protection when a sturdy shelter is not nearby. Tornadoes harm people primarily through airborne debris. So being outdoors when a tornado strikes poses a threat if there are things nearby that could go flying through the air. Do not stay in your car or get into a car to get away from a tornado. Cars are death traps in these storms because they can be tossed about by high winds or crushed by debris.

One of the most important things you can do to prevent being injured in a tornado is to be alert to the onset of severe weather. If a tornado watch is issued for your area, it means that a tornado is possible. If a tornado warning is issued, it means that a tornado has actually been spotted, or is strongly indicated on radar, and to go to a safe shelter immediately. If you see a tornado and it is not moving to the right or to the left relative to trees or power poles in the distance, it may be moving towards you! Although tornadoes usually move from southwest to northeast, they also move toward the east, the southeast, the north and even northwest.

In high-rise and large buildings, central stairwells are good, but elevators are not. If the building loses power, you may be in the elevator for a long time. If there is no sturdy building nearby, lie face down in a ditch and cover your head with your hands.

- Leave auditoriums, gyms, and other free-span rooms.
- Go to interior rooms and halls on the lowest floor but avoid halls that open to the outside in any direction.
- Stay away from glass, both in windows and doors.
- Crouch down, and make as small a "target" as possible. If you have something to cover your head, do so, otherwise, use your hands.

Encourage your family members to plan for their own safety in many different locations. It is important to make decisions about the safest places well before you ever have to go to them. An underpass is not a safe refuge from a tornado. While videos may show people surviving under an underpass, those tornadoes "just missed." In fact, people were killed hiding in underpasses during the May 3 Oklahoma tornadoes.

Tornadoes are measured by the Fujita scale, developed by the late Dr. T. Theodore Fujita at the University of Chicago. The scale ranks tornadoes from F0 to F5, with F0 indicating a tornado that does light damage and has wind speeds up to 73 mph. An F5 tornado does incredible damage and has wind speeds greater than 261 mph. Only 2 percent of tornadoes reach the F5 level.

The JSC Employee Warning System will be used to warn employees to take shelter until the danger passes. Additionally, the Emergency Information Line, 281-483-3351, will be updated with current information about the threat or emergency response status. ■



TICKET WINDOW

Exchange Store hours

Monday-Friday

Bldg. 3 7 a.m.-4 p.m.

Bldg. 11 9 a.m.-3 p.m.

All tickets are nonrefundable.

Metro tokens and value cards are available.

For more information, please call x35350.

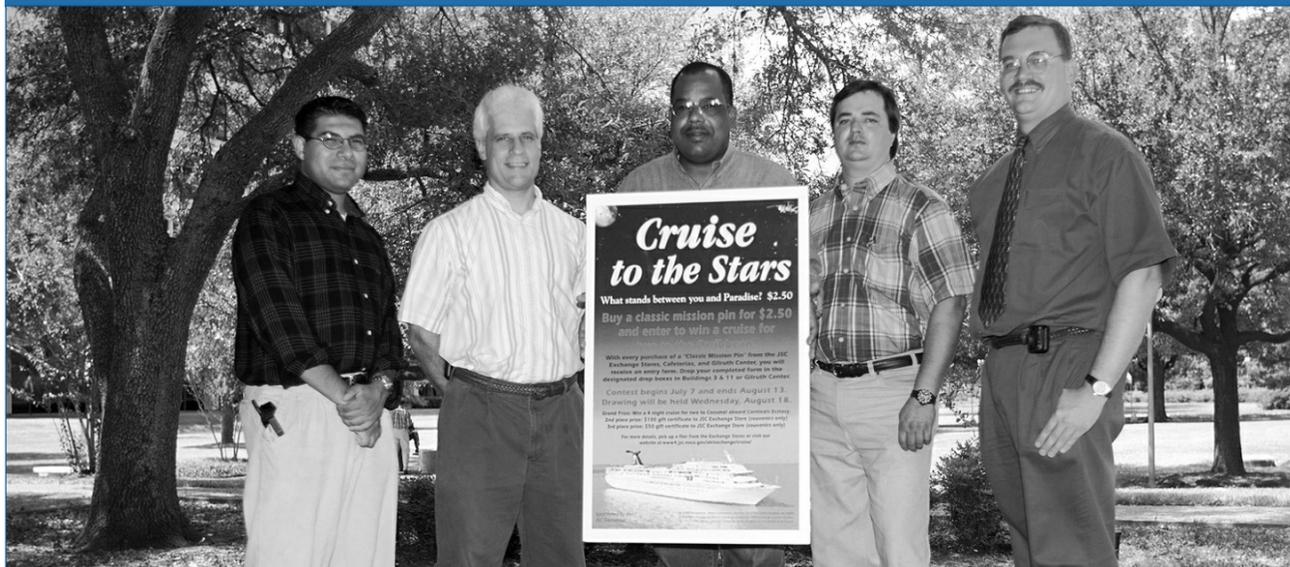
UPS is moving to Bldg. 11 effective September 15, 1999.

The following discount tickets are available at the Exchange Stores

General Cinema Theaters	.....	\$5.50
Sony Loew's Theaters	.....	\$5.00
AMC Theaters	.....	\$4.75
Fiesta Texas	.....adult .. \$18.25 .. (child under 48")	.. \$15.50
Astroworld One-day Admission	.....	\$21.00
Water World	.....	\$10.75
Moody Gardens (2 events) – ticket does not include Aquarium or Pyramid	..	\$10.75
Moody Gardens – Aquarium only	.....	\$9.25
Sea World	.....adult .. \$27.25 .. child (age 3-11)	.. \$18.25
Schlitterbahn Water Park	.....adult .. \$20.75 .. child (age 3-11)	.. \$17.50
Space Center Houston	.....adult .. \$10.25 .. child (age 4-11)	.. \$6.50
(JSC civil service employees free.)		
Space Center Houston Annual Pass	.....	\$18.75
Splash Town Water Park	..... adult .. \$14.50 (child 48" and under)	.. \$11.50

Effective October 1, the JSC Exchange will accept personal checks with a valid Texas driver's license. A NASA badge will no longer be required. There will be a \$25 charge on all returned checks.

Exchange Store announces 'Cruise to the Stars' winners

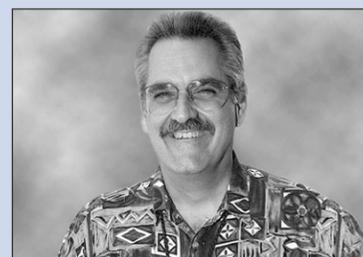


JSC Photo 99E11059

Greg Weaver, center, was the grand prize winner of the recently concluded NASA Exchange-JSC promotional campaign that offered a cruise for two to the majestic waters of Cozumel. Barry Martin, second from right, won a \$100 gift certificate redeemable at the Exchange Store and Frank Brody, second from left, won a \$50 gift certificate. Shown with the winners are Jose J. Tristan, left, Exchange co-op and campaign organizer, and Karl Schuler, right, JSC Exchange manager.

Faces in the crowd

What attracted you toward a career in the space program?



JSC Photo S99-10587 by William Stafford

Andy Evans
USA, SSP/ISS Program Integration
Manager, Logistics and Maintenance

I'd been interested in space since I was a child and followed the space program religiously. My dad and I would watch Mercury, Gemini, Apollo missions and of course, the culmination was the landing on the moon. When I retired from the Army, I had a chance to use the skills I had learned from that experience here.



JSC Photo S99-09559 by William Stafford

Alex McCauley
USA
ISS Logistics and Maintenance

I have always known that this is what I wanted to do. When I was 5 years old, I watched the orbiting satellites from my backyard and I decided I wanted build things that would go into space.



JSC Photo S99-11199 by James Blair

Darrel Gaines
Raytheon
Flight Integration

I was attracted to the space program by its ability to provide work that was exciting, successful, visible and challenging. The top two items that motivate people are achievement and recognition. NASA provided me an opportunity to enjoy both.



JSC Photo S99-05960 by William Stafford

Angela Turner
USA
Computer Science Staff

I've always been fascinated with space and technology, especially the stars. While I was visiting Clear Lake, I saw JSC and knew immediately I wanted to work there. I always end up asking the astronomers about their jobs and the peek we have of the heavens.

Teaching rocket science with model rockets

JSC engineers and co-ops look on as a student-designed model rocket is launched from the antenna range at JSC. The model was designed from scratch to fulfill specific requirements for altitude (must achieve between 100 and 250 meters) and payload (must launch a raw egg and return it unbroken). The model rocket design workshop teaches teamwork and the principles of basic rocket design to teams of students and young engineers.

The specific rocket leaving the pad ("Spitz-1") was designed by four International Space University students attending a summer session program in Thailand. JSC engineer and ISU faculty member John Connolly conducted the rocket design workshop and returned to launch the finished rockets from JSC. "Spitz-1" successfully returned its payload uncracked, but fell 5 meters short of its altitude goal. ■



JSC Photo S99-09408

GILRUTH CENTER NEWS

<http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Hours: The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday. Contact the Gilruth Center at (281) 483-3345.

Sign up policy: All classes and athletic activities are on a first-come, first-served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, cash or by check, at the time of registration. No registration will be taken by telephone. For more information, call x33345.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Nutrition intervention program: Six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. Program is open to all employees, contractors and spouses. For details call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is \$25. Call for next available class.

Stamp club: Meets every second and fourth Monday at 7 p.m. in Rm. 216.

Weight safety: Required course for employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. The cost for additional family members is \$50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Step/bench aerobics: Low-impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Taragzewski, instructor.

Yoga: Stretching class of low-impact exercises designed for people of all ages and abilities in a Westernized format. Meets Thursdays 5-6 p.m. Cost is \$32 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

Ballroom dancing: Classes meet from 6:30-7:30 p.m. Thursdays for beginner, 8:30-9:30 p.m. for intermediate and 7:30-8:30 p.m. for advanced. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health-related fitness program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

PEOPLE *on the* **MOVE****Human Resources reports the following personnel changes:****Key Management Assignments**

Charlie Stegemoeller was named manager, Human Space Life Science Programs Office, Space and Life Sciences Directorate.

Irene Piatek was selected as manager, Station Engineering Office, Engineering Directorate.

Peggy Wooten was named manager, External Relations Office, Office of the Associate Director.

Linda Ulijohn was named chief, Avionics Division, Mission Operations Directorate.

Dennis Davidson was named deputy chief, Avionics Division, Mission Operations Directorate.

Promotions

Sandy Boriack was selected as a configuration management specialist in the Configuration Management Office, International Space Station Program Office.

Reassignments Between Directorates

Ron Newman moves from the International Space Station Program Office to the Mission Operations Directorate.

Greg Buoni moves from the Space Shuttle Program Office to the Engineering Directorate.

Jennifer Mason-Korecki moves from the International Space Station Program Office to the Center Operations Directorate.

Dorothy Rasco moves from the Center Operations Directorate to the Space Shuttle Program Office.

Sharon Hobbs moves from the Space and Life Sciences Directorate to the Office of the Chief Financial Officer.

Reassignments to Other Centers

Desiree Thompson of the Safety, Reliability, and Quality Assurance Office moves to Stennis Space Center.

Retirements

Pat McHan of the Office of the Chief Information Officer.

Jon Axford of the Information Systems Directorate.

Resignations

Paula Greenthaner of the Engineering Directorate.

Christine Iacomini of the Engineering Directorate.

DATES & DATA**September 10**

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. September 10 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For more information, call Chuck Shaw at x35416.

September 12

Westside NSS meets: The Westside group of the Clear Lake area chapter of the National Space Society will meet at 2 p.m. September 12 at Silicon Graphics, 11490 Westheimer, Suite 100. For more information, call Murray Clark at (281) 367-2227.

September 14

Aero Club meets: The Bay Area Aero Club will meet at 7 p.m. September 14 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

NPMA meets: The National Property Management Association will meet at 5 p.m. September 14 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For more information call Sina Hawsey at x36582.

September 15

Astronomy seminar: The JSC Astronomy Seminar Club will meet at noon September 15, 22, and 29 in Bldg. 31, Rm. 248A. For more information, call Al Jackson at x35037.

Scuba club meets: The Lunarfins will meet at 7:30 p.m. September 15. For more information, call Mike Manering at x32618.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. noon September 15, 22, and 29 at the House of Prayer Lutheran Church. For more information, call George Salazar at x30162.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. September 15, 22, and 29 at United Space Alliance, 600 Gemini. For more information, call Patricia Blackwell at (281) 280-6863.

September 16

Communicators meet: The Clear Lake Communicators, a Toastmasters club, will meet at 11:30 a.m. September 16, 23 and 30 at Freeman Library, 16602 Diana Lane. For more information, call Allen Prescott at (281) 282-3281 or Mark Caronna at (281) 282-4306.

NSS meets: The Clear Lake area chapter of the National Space Society will meet at 2 p.m. September 16 at the Freeman Memorial Branch Library, 16602 Diana Lane. For more information, call Murray Clark at (281) 367-2227.

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. September 16 in Bldg. 45, Rm. 712D. For more information on this open meeting, contact Lynn Buquo at x34716.

September 17

Star Party: The JSC Astronomical Society will host a public star party at Moody Gardens September 17. For more information call Chuck Shaw at x35416.

September 27

Alzheimer's support group meets: The Clear Lake Alzheimer's Caregiver Support Group will meet at 7:30 p.m. to 9 p.m. September 27 in the first floor conference room, St. John Hospital West building, Nassau Bay. For more information, contact Nancy Malley at (281) 480-8917 or John Gouveia (281) 280-8517.

September 30

Radio Club meets: The JSC Amateur Radio Club will meet at 6:30 p.m. September 30 at the Piccadilly, 2465 Bay Area Blvd. For more information, call Larry Dietrich at x39198.

October 2

Star Party: The JSC Astronomical Society will host a public star party at Challenger 7 Park. For additional information call Chuck Shaw at x35416.

NASA BRIEFS**BALLOON-BORNE INSTRUMENT COLLECTS ANTIMATTER**

It almost sounds like a science-fiction movie: NASA launched a 60-story-high balloon to the upper fringes of Earth's atmosphere to collect precious particles of some of the rarest stuff in the universe – antimatter – and, just possibly, evidence that entire anti-galaxies exist.

It wasn't science fiction, but cutting-edge science. Carrying a Japanese-built instrument, NASA's largest balloon – 39 million cubic feet in volume – lifted off from Lynn Lake, Manitoba, Canada, at 9:22 a.m. EDT August 11 for a 38-hour flight more than 20 miles above Earth. The 5,000-pound instrument was recovered August 12 and will be prepared for another flight next year. The BESS project (Balloon-borne Experiment with a Superconducting Solenoidal magnet), led by Prof. Shuji Orito of the University of Tokyo, is sponsored in the U.S. by NASA and by Monbusho in Japan.

Antiparticles are rare forms of matter that have electrical charges exactly the opposite of their ordinary "sister" particles. For example, a proton has a positive charge and an electron has a negative charge. An antiproton, though, has a negative charge and an antielectron has a positive charge. Scientists study antimatter to understand structure and energy processes in the universe.

NASA SELECTS SPACECRAFT TO TEST SPACE TECHNOLOGY

They're each about the size of a large birthday cake, weigh about as much as a desktop computer, and are smart enough to fly in formation far from Earth while they test new technologies.

They are three very small satellites, called the Nanosat Constellation Trailblazer mission, and NASA selected them as the agency's latest New Millennium mission. The mission will validate methods of operating several spacecraft as a system, and test eight technologies in the harsh space environment near the boundary of Earth's protective magnetic field, or magnetosphere.

Each Trailblazer spacecraft will be an octagon 16 inches across and 8 inches high, and each will have booms and antennas that will extend after launch. The mission will cost \$28 million and will be launched in 2003 as a secondary payload on an expendable launch vehicle. The mission is managed by NASA's Goddard Space Flight Center, Greenbelt, MD.

Results from the Trailblazer mission will be used to design future missions using constellations of lightweight (about 44 pounds), highly miniaturized autonomous spacecraft. One proposed constellation of up to 100 spacecraft positioned around the Earth will monitor the effects of solar activity that can affect spacecraft, electrical power and communications systems. Others will study global precipitation and the atmospheres of other planets.

The Nanosat Constellation Trailblazer is the fifth in the agency's New Millennium program, which tests technology for future space and Earth science missions. The program's goal is to dramatically reduce the weight, size and costs of missions while increasing their science capabilities.

SPACE CENTER Roundup

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